

WHAT IS CLAIMED IS:

1. A projection exposure apparatus, comprising:
an illumination optical system for
illuminating a pattern formed on a first object, with
5 light;
a projection optical system for projecting
the pattern of the first object, illuminated by said
illumination optical system, onto a second object for
exposure of the same with the pattern;
10 a main system including said illumination
optical system and said projection optical system; and
an interferometer for use in measurement of
an optical characteristic of said projection optical
system and being mounted on said main system.
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2. An apparatus according to Claim 1, wherein
said interferometer includes a detection optical
system for observing a light beam from one of the
first and second objects, said detection optical
20 system being disposed outside an exposure light flux
of said projection optical system in an exposure
process and being moved onto a light path of said
projection optical system in a process for measurement
of wavefront aberration of said projection optical
25 system.
3. An apparatus according to Claim 1, further

comprising first and second light sources, wherein
said first light source is used with said illumination
optical system for illumination of the pattern, and
wherein said second light source is used with said
5 interferometer.

4. An apparatus according to Claim 3, wherein
said interferometer is operable to perform measurement
with respect to plural points within an exposure
10 region of said projection optical system.

5. An apparatus according to Claim 4, wherein an
aberration characteristic of said projection optical
system within the exposure region is detected on the
15 basis of measurements made with respect to said plural
points.

6. An apparatus according to Claim 5, wherein a
curvature of image field of said projection optical
20 system is measured on the basis of measurements made
with respect to said plural points.

7. An apparatus according to Claim 6, wherein
the curvature of image field of said projection
25 optical system is detected on the basis of (i) a
coordinate position of said detection optical system
of said interferometer with respect to an optical axis

direction, upon measurements of a wavefront with
respect to said plural points, (ii) the wavefront as
measured by said interferometer, and (iii) a
coordinate position of a spherical surface mirror,
5 provided in said interferometer, with respect to the
optical axis direction of said projection optical
system.

8. An apparatus according to Claim 5, wherein
10 light from said projection optical system is reflected
by one of a flat mirror and a wafer.

9. A system according to Claim 5, wherein
distortion of said projection optical system is
15 measured on the basis of measurements made with
respect to said plural points.

10. An apparatus according to Claim 9, wherein
the distortion of said projection optical system is
20 detected on the basis of (i) a coordinate position of
said detection optical system of said interferometer
with respect to an optical axis direction, upon
measurements of a wavefront with respect to said
plural points, (ii) the wavefront as measured by said
25 interferometer, and (iii) a coordinate position of a
spherical surface mirror, provided in said
interferometer, with respect to the optical axis

direction of said projection optical system.

11. An apparatus according to Claim 1, wherein
said interferometer is disposed on a side of said
5 projection optical system, facing to the first object.

12. An apparatus according to Claim 11, wherein
said interferometer includes a spherical surface
mirror disposed adjacent to an image plane which is on
10 one side of said projection optical system facing to
the second object.

13. An apparatus according to Claim 12, wherein
said spherical surface mirror is mounted on a stage
15 for the second object, being provided in said main
system.

14. An apparatus according to Claim 13, wherein
said spherical surface mirror is made movable along an
20 optical axis direction of said projection optical
system, through moving means being provided for focus
adjustment of said projection optical system within
said main system.

25 15. An apparatus according to Claim 14, further
comprising a detection optical system having a TTR
alignment scope with an objective lens, being mounted

on said main system.

16. An apparatus according to Claim 1, wherein
said interferometer is disposed on one side of said
5 projection optical system, facing to the second
object.

17. An apparatus according to Claim 16, wherein
said interferometer includes a spherical surface
10 mirror disposed adjacent to an image plane on one side
of said projection optical system facing to the first
object.

18. An apparatus according to Claim 1, wherein
15 said interferometer comprises a Fizeau type
interferometer.

19. An apparatus according to Claim 1, wherein
said interferometer comprises a Twyman-Green type
20 interferometer.

20. An apparatus according to Claim 1, wherein
said interferometer comprises a radial share type
interferometer.

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21. fAn apparatus according to Claim 1, wherein
measurement through said interferometer is performed

in accordance with a fringe scan method.

22. An apparatus according to Claim 1, further
comprising light guiding means for guiding light from
5 a light source of said interferometer into a light
path of said projection optical system.

23. An apparatus according to Claim 1, wherein
said interferometer is used with light of double
10 harmonic of an argon laser of a wavelength 496 nm.

24. An apparatus according to Claim 1, wherein
said interferometer is used with light of a basic wave
of an argon laser of a wavelength 368.8 nm.

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